extends along the course of the colon, especially when there is maximum intensity over the cecum and ascending colon. I believe with Musgrave, that the presence in the stools of any form of ameba in warm or tropical regions should be considered diagnostic for purposes of treatment, whether or not active symptoms are present.

Thus by carefully examining every suspected case of possible amebic infection and by early and energetic treatment along the lines herein considered this otherwise serious disease can in nearly every instance be promptly and permanently relieved.

THE DIAGNOSIS OF TUBERCULOSIS IN EARLY LIFE.[1]

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This paper has to do with the chronic form of pulmonary tuberculosis in children, and does not consider the acute manifestation of the disease, such as general miliary tuberculosis, tuberculous meningitis, or the acute bronchopneumonic form which complicates or follows some one of the acute infectious diseases; nor does it consider the surgical aspects of the disease. There are two reasons for this: In the first place, children suffering from the disease in any of the forms above mentioned usually are taken to the general hospitals and are rarely seen in a dispensary devoted exclusively to tuberculous patients, and in the second place, while individual cases may present difficulties in making a diagnosis, the clinical picture in the majority of cases of this type is usually readily recognized.

Excluding the types just mentioned the recognition of tuberculosis in children is either extremely easy or most difficult, the determination of a positive or negative finding depending almost entirely on the attitude of the particular observer. Thus, in some instances, all children having a tuberculous parent have been considered as being likewise tuberculous. In others the occurrence of a positive tuberculin reaction or the presence of palpable lymph nodes in the neck have been considered as sufficient evidence to designate the child as having tuberculosis.

[1] Read before the Philadelphia Pediatric Society, May 12, 1914.

The reason for the current belief that tuberculosis is an extremely common finding in children, particularly in children of the poorer classes, is largely due to the general acceptance of the theory that infection with tuberculosis is commonly acquired in childhood. That this is true in many, possibly the majority, of cases everyone agrees. That it is invariably the case, however, has not been proved. The theory that infection in childhood is the universal one, if it could be shown conclusively to be true, would at once dispel all the uncertainties regarding the etiology of the disease; and furthermore, it would change very radically our procedures in the way of prevention.

At first sight the etiology of tuberculosis seems perfectly clear. If, however, we analyze the subject more closely we are forced to admit that we know very little about it. This may seem to be putting the question too strongly; but let us examine some of the facts and see how matters stand. That infection with the tubercle bacillus is widespread, and, furthermore, that it commonly occurs early in life, is practically universally acknowledged. So far we stand on reasonably firm ground. When, however, we attempt to explain why relatively few of those thus infected develop tuberculosis which is clinically recognizable while the majority of infected individuals pass through life with no manfestations of the disease we can only hazard a surmise.

A number of factors must be considered—namely, the question of hereditary predisposition, the influence of race, poor food, bad housing conditions, overwork, mental worry, acute illness, dissipation, and, lastly, reinfection later in life. Anyone of these may be sufficient to lower the resistance of the individual to a point where the natural defences of the body can no longer keep in check the multiplication and spread of tubercle bacilli already within the body. It seems apparent, therefore, that while many children may receive an implantation early in life the determining factor as to whether they become openly tuberculous later in life is dependent on a number of factors, most of which have to do with unsanitary evils. For the most part the problem becomes one of a diagnosis of the social surroundings of the child rather than of its physical condition. It is, of course, understood that the same effort should be made with children as with adults to recognize those having true clinical tuberculosis.

The present study relates to 362 children examined at the Phipps Institute between three and four years ago. The majority of them were brought for examination because of tuberculosis in one or the other parent and not because the children themselves had any symptoms. Reports as to the condition of 111 of these children have been obtained within the past two or three months. The examination of these children was made by five men on the dispensary staff and a study of the records affords a good illustration of the points of view of different observers. Of the 362 a positive diagnosis of tuberculosis was made in 96 (26.5 per cent.). In studying the records the conviction cannot be escaped that this percentage is either too low or too high for the reason that many cases designated as non-tuberculous could readily be classed as having tuberculosis, and *vice versa.* In other words, undoubted evidence of tuberculosis was present in but a few; in the remainder the individual's point of view seemed to be the determining factor in making a positive or negative diagnosis. It might be well to mention at this point that of the 111 of these children recently heard from, 25 had a diagnosis of tuberculosis over three years ago. All of these children are reported as well except 2, 1 of whom recently died of tuberculosis and 1 of a cause unknown.

SYMPTOMS. The symptomatology of tuberculosis in adults, while subject to many vagaries, is invaluable in making a diagnosis. Indeed in many cases of incipient tuberculosis it is our chief reliance in determining the nature of the trouble. In children, on the other hand, we are deprived of much of the value of symptoms, because of the inability of young children to give a correct description of their trouble; and in the case of the present group the difficulty is augmented by reason of the fact that they are for the most part, the children of foreign parents, who, in many instances, are almost as useless as the children themselves so far as giving a history of the illness is concerned.

TEMPERATURE. One of the most reliable means of detecting early tuberculosis in the adult is the slight rise in temperature which may occur daily or only every few days. In children, however, little reliance can be placed in these slight elevations of temperature, for the reason that growing children normally have a higher temperature than adults. Landois[2] gives as the normal limits 99.5° to 100.1° F. (37.87° to 37.62° C.) in children from five to nine years; 190 of the 362 children had a temperature of from 99° to 100° F. The reason for this is, in all probability, a more active metabolism, although other influences of undetermined origin may also, in part, be contributory; 143 (31.3 per cent.) complained of cough. As a rule this was of but a few days' duration; 223 (61.6 per cent.) stated that there was no expectoration. The sputum of 37 was examined, with negative results. Hemoptysis was said to have occurred in 16. Chest pain was complained of in 95. Hoarseness of a transient character was noted in 48 and persistent hoarseness in 9. Night sweats occurred in 52.

Cough, if it has persisted for weeks, hemoptysis, and persistent hoarseness would have the same significance in the child as they do in the adult.

PHYSICAL SIGNS. In taking up the question of physical signs in the chests of infants and young children we have to consider what is probably the most difficult phase in the art of physical diagnosis. And while it is true that the underlying principles which enable us to detect disease in the chest are the same, whether it be adult or child, there are certain differences between the two which must be kept in mind. Generally speaking the man whose training has been confined to the examination of adults alone, or children alone, is likely to draw false conclusions when he invades one or the other field, and much that has been written regarding the presence of chronic tuberculous lesions in the lungs of children has been contributed by those whose standards have been obtained by the examination of adults with tuberculosis.

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[2] Text-book of Human Physiology, 10th ed., p. 391.

Furthermore, it must be borne in mind that the clinical forms of human tuberculosis in different ages possess correspondingly different anatomical features, a knowledge of which is necessary for the understanding of the interpretation of physical signs. In the majority of instances, tuberculosis, when it involves the lungs of infants and young children, is bilateral, widespread (either of the miliary or bronchopneumonic form), and acute in character.

In the adult, on the other hand, the disease begins at one or the other apex, follows a fairly definite course in its progress, and is chronic in character, although subject to periods of acute activity. As a rule the clinical manifestations of tuberculosis as they occur in infants and young children differ from the adult type, and this is not altered by the fact that the juvenile type may occur in adults, and *vice versa*.

It is not altogether easy to fix definitely the age period at which the signs peculiar to children cease. Some have arbitrarily fixed this limit at the age of six years, although in our judgment ten years would be more nearly correct.

Probably the most distinctive difference between the adult and the child is that in the latter all of the sounds are exaggerated. Not only is the breathing of the familiar puerile type, but all the vocal sounds are increased, and in addition the percussion note is commonly hyperresonant.

As an illustration of how the exaggeration of physiologically normal signs may be misinterpreted in the child it is interesting to note that of 79 children in this group who were charted as having abnormal physical signs no less than 67 had impairment and bronchovesicular breathing at the right apex. It will be recalled that in the adult the right apex normally has a slightly impaired note, prolonged expiration, and increased fremitus, and that the explanation of this was pointed out by Fetterolf[3] as being due to close proximity of the trachea to the right upper lobe. The very high proportion of cases in this group, with apparent disease at the right apex, would seem to indicate that what was in reality a normal finding was interpreted as being pathological.

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[3] Archives of Internal Medicine.

One's belief in this is strengthened from the result of reports on 111 of these children three or four years after the first observation. Of these 111 cases 17 were noted as having a diseased right apex, and in 2 more both apices were supposed to be affected. At the present time 17 of the 19 are noted as being in good health, 1 has died of tuberculosis, and 1 still has some cough.

In addition to the exaggeration of the breath sounds already noted the respiratory sounds in children are subject to a number of vagaries, and the younger the child the more difficult is the interpretation of the auscultatory signs.

The expired air may, for instance, be directed into the pharyngeal vault or against the roof of the mouth, with the result that a bronchial quality of breathing is heard all over the chest. This can be obviated if the child is old enough to learn how to breathe properly. Then again in young children and infants the lungs at times seem to move independently of one another, with the result that loud puerile breathing is heard over one side, while over the opposite side the breath sounds are almost inaudible, and this condition shifts from side to side. This peculiarity is often due to faulty posture. If care is not taken to see that the child sits straight, and that one or the other side is not held tense, not only will there be very faint or nearly absent breath sounds on the cramped side, but in addition the percussion note may be impaired, or indeed absolutely dull. We have often demonstrated this fact to students and shown them how the signs on the two sides can be almost instantly reversed. This fact is worth remembering, as the unwary may make a diagnosis of pneumonia or pleural effusion.

In adults one of the most valuable means of detecting early pathological changes at the apex is the restriction of expansion over the affected area. In children this procedure is almost useless, except in a few of the older ones, because of jerky movements, and what has seemed to us to be often the case, the fact that the lungs of infants and young children do not seem to possess the same synchronous movement that the adult organs possess.

Lymph Nodes. In nearly every article dealing with the diagnosis of tuberculosis in children great stress has been laid on the presence of palpably enlarged cervical lymph nodes. Indeed in not a few instances, in which surverys of large groups of children have been made, this apparently has been the only evidence on which the diagnosis was made. The fact has been ignored that the age of childhood is likewise known as the lymphoid age, and that all children, irrespective of their social condition, have lymph nodes which are readily palpable. The enlargement of the lymph nodes is not readily detected until about the second year, but from then on until shortly before or after the age of puberty this is the case, although as the child approaches adolescence certain groups, such as the epitrochlear, the axillary, and the inguinal, tend to shrink in size and become less easily detected. The submaxillary node at the angle of the jaw is usually the largest under normal conditions, and is usually the last to shrink to a size that it can no longer be palpated.

In our experience all of the superficial lymph nodes can be palpated readily in the majority of cases if the children are systematically examined from this standpoint.

To confine the examination to one group, such as the cervical and because the nodes in this situation are palpable, to assume that it is an evidence of tuberculous infection does not seem in any way justifiable, especially so in view of the fact that all the lymph nodes of the body are hypertrophied according to adult standards.

If there exist in the neck a single large node or a tumor mass made up of a number of nodes, which are matted together and adherent to the surrounding tissues, the presumption is strong that we have to deal with a tuberculous adenitis, and especially so if there is evidence of softening, or the overlying skin is inflamed. This, however, is true scrofula, and has nothing to do with nodes which vary in size from that of a bean to a split pea, or smaller, which are freely movable, and which manifest neither softening nor inflammation.

Of the 362 children here reported the records show the following results: cervical, 250; submaxillary, 202; axillary, 209; epitrochlear, 94; inguinal, 212.

It is to be borne in mind that the above records are of positive value almost entirely, and that the discrepancies between the different groups are largely because the examination was not complete.

Still another group of lymph nodes must be considered, namely, the bronchial. Of recent years a great deal has been written on the physical signs and symptoms of tuberculous enlargement of this group, especially the former. Some writers have reported quite a high percentage of cases in which this condition existed. Much of the evidence on which such a diagnosis is made seems open to question, especially from the standpoint of physical signs. In our opinion the alleged percussion changes, such as the semilunar areas in the second and third interspaces anteriorly and the vertebral dulness posteriorly, which are supposed to be indicative of such enlargement, are fanciful rather than real, and the questionableness of such findings has been shown by Gittings and Fetterolf[4] in their work on frozen sections of the thoraces of infants and young children.

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[4] Some Anatomical Features of the Child's Thorax; Their Application in Physical Diagnosis, Amer. Jour. Dis. of Children, 1911, vol. i.

X-ray studies made by Pancoast of children in whom we suspected this condition might exist have given negative results in the majority of instances. The mere fact that these nodes may show some enlargement on *x*-ray examination is no proof that they are pathologically enlarged in view of the fact that we know all the superficial nodes are hypertrophied normally.

The truth of the matter is that this diagnosis is not easy. Children below par and who have a persistent hard, brassy cough, usually unproductive, seem to be the ones most likely to suffer from this condition.

In this connection it may not be amiss to say something regarding the tonsils, as they are regarded by many as portals of entry for the tubercle bacillus. Here again we are dealing with lymphoid tissue, which in children is excessive, and which, as the years pass, tends to shrink until the relatively large tonsil of the child is transposed to the atrophied one of old age. The removal of tonsils which are enormously enlarged, and which are associated with frequent colds, or inflammation of the tonsils themselves, is one thing, but the wholesale massacre of these organs simply because they are enlarged, according to adult standards, is in our opinion a mistake. Our records show that of 290 children examined from this standpoint 110 were noted as having some enlargement of the tonsils.

Mouth-breathing was noted in 144, although adenoids were detected in but 24. These latter figures are not trustworthy, however, as but a small percentage had a skilled nose and throat examination.

TEETH. While the condition of the teeth has no direct bearing on the diagnosis of tuberculosis in growing children it is coming to be recognized more and more that the general health of the child may be adversely affected by a large number of badly decayed teeth. Thus bad teeth may be one of the contributing factors in lowering the general resistance and permitting the latent tuberculous infection to gain the upper hand.

Of the 191 children examined as to the condition of their teeth, 48 were classed as good, 69 as fair (that is but two or three decayed teeth), and 74 as being very bad.

TUBERCULIN TESTS. The accepted belief at the present time is that a positive reaction to one of the tuberculin tests is indicative of a tuberculous lesion somewhere within the body. A positive test does not mean, however, that the individual has clinical tuberculosis. It must clearly be kept in mind that there is a great difference between tuberculosis that is clinically recognizable and hypersensitiveness to tuberculin. Hypersensitiveness is extremely common, and is encountered in a large proportion of children, the frequency with which it is met increasing rapidly from the second to the fifteenth year. It is a great mistake to assume that because a child reacts to some one of the tuberculin tests that it is tuberculous in the sense that it needs active treatment; and, as we shall later point out, a negative tuberculin test does not entirely free us from responsibility.

In regard to the tests themselves there are certain facts which should be kept in mind. First as regards the subcutaneous test. This is rarely employed in children, especially the very young ones. At one time the test was extensively used in adults and a positive reaction was, and by many still is, regarded as conclusive proof that the individual has tuberculosis. Of recent years, however, some observers have warned against its use, pointing out that the test is capable, in certain instances, of stirring an inactive lesion into an active one. Furthermore, there is now a tendency not only to limit the use of the test, but in addition to ignore the constitutional symptoms of a reaction (such as fever, joint pains, local reaction, etc.) and to call positive only those cases which give a focal reaction, such as rales at a suspected apex, or some pain, redness, and swelling in a suspected joint.

The cutaneous or von Pirquet test has achieved enormous popularity by reason of its simplicity, and also because it is widely credited with being positive evidence of tuberculosis. In children under two years of age it is valuable evidence when positive and usually means clinical tuberculosis. Beyond the second year, however, it loses much of its positive value, and the older the child the more unreliable it is as an evidence of true tuberculosis.

The percutaneous or so-called Morro test has about the same significance.

Finally we have to consider the conjunctival test introduced by Wolf-Eisner and Calmette. The majority of observers have come to regard this test as dangerous, because of the possibility of producing an inflammatory condition which may lead to serious damage of the eye. According to Hamman and Wolman,[5] who have employed the test in a large series of cases, the test is free from danger, and is superior to the Morro and von Pirquet tests in that it is not so sensitive and that a positive reaction points strongly to an active rather than a latent process, especially so when supported by other indications.

Of the 361 children under discussion, 100 gave a positive and 93 a negative von Pirquet reaction. This does not represent the total number given the test, as many more received it but did not return to the dispensary to see whether the reaction was positive or negative.

The question naturally arises, What is the practical value of the von Pirquet or Morro test in determining the children who have true tuberculosis and those who can be disregarded? We are forced to conclude that they are of little value except as an evidence of hypersensitiveness. We have repeatedly seen anemic, undernourished children with or without tuberculous parents who gave no reaction; and, on the other hand, we have encountered children who presented no physical signs who were in robust health and who had violent skin reactions.

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[5] Tuberculin in Diagnosis and Treatment, 1912.

SOCIOLOGICAL CONDITIONS. The really important thing to determine in regard to these children is this: Are they physiologically normal, and if they show any evidence of being below par, what is the cause? In the great majority of instances it will be found that those below the normal are suffering from sociological evils rather than tuberculosis. Viewed in this light it is relatively unimportant whether the child shows evidences of hypersensitiveness or not, because if allowed to remain amid unsanitary surroundings it will quite likely become infected, or if infection has already occurred the chances of true clinical tuberculosis developing are greatly enhanced.

It has been recognized for some years that the tuberculosis problem is a complex one and one that is not to be solved by purely medical procedures, so that in determining the question as to whether a child is in need of preventive treatment we are in the majority of cases confronted with a condition of malnutrition, partly the result of poor and insufficient food and partly the result of unsanitary living conditions. In other words, we have not discharged our duty to the child by simply saying that he has or has not tuberculosis.

Thus the general appearance of 141 of the 362 children was noted as being bad, while of 155 whose weight was recorded, 82, or 52.9 per cent., were found to be under weight for their age.

The term "pretuberculous" has been applied to that large group of children who, while not clinically tuberculous, are objects of suspicion, either because of tuberculous parentage, poor living conditions, or who are themselves badly undernourished. The term "pretuberculous" has been objected to, but as it has come to be so generally understood that it means children who, if allowed to drift, are prone to become actively tuberculous, that we can see no great reason for not using it.

Certain interesting facts are revealed as to the social conditions of the 362 children forming the basis of this paper, and while none of the facts are new, they will bear repeated emphasis.

These 362 children belonged to 210 families. What constitutes a proper income for a family of three or five or seven is somewhat conjectural, depending as it so often does on habits of thrift or extravagance. It is usually assumed, however, that not more than one-quarter of the income should be expended for rent, and that the food allowance should be $1.50 per week per capita, approximating 21 cents per capita each day. Of 154 families studied on this basis the number with an adequate income was 68, or 44.17 per cent., while 86, or 55.83 per cent., had an inadequate income; 50 families were paying an excessive rent.

The following table shows the extent to which over-crowding exists:

Families living in 1 room to each member	102
" " 1 " 2 members	70
" " 1 " 3 "	25
" " 1 " 4 "	8
" " 1 " 5 "	2
" " 1 " 6 "	2
" " 1 " 7 "	1
Total	210

Distinct overcrowding occurred in 38, or 18 per cent., of the 210 families.

Still another aspect of the problem is seen in the following table, which shows the number of rooms occupied by each family:

Families living in 1 room	17
" " 2 rooms	39
" " 3 "	52
" " 4 "	42
" " 5 "	20
" " 6 "	29
" " 7 "	4
" " 8 "	4
" " 11 "	1
" " 13 "	1
" " 14 "	1
Total	210

No data is available as to the hygienic conditions of these families at the time of the original examination, but we do know the conditions under which 111 of the children are at present living. A recent investigation shows that 48, or 46.2 per cent., of the children are living in poor, dirty, and unhygienic surroundings, while 13, or 11.7 per cent., of the home conditions are classed as only fair. The remaining 50 are living in clean surroundings.

Two facts are now well known: (1) that both the morbidity and mortality rates are always higher among those living under unsanitary conditions; and (2) that there is almost instant improvement in children when they are given sufficient nourishing food and healthful surroundings. The latter fact is now well established by reason of the results obtained in open-air schools and in sanatoria which admit children of the so-called pretuberculous type.

We would, therefore, repeat that the main problem consists in determining whether the child is physiologically normal, and if not, of using every endeavor to provide the means of making it so.